

Lockheed Martin Corporation  
Space and Strategic Missiles Sector Washington Operations  
Crystal Square 2 - Suite 300 1725 Jefferson Davis Highway Arlington, VA 22202  
Telephone 703-413-5800 Facsimile 703-413-5819

ORIGINAL

LOCKHEED MARTIN

EX PARTE OR LATE FILED

RECEIVED

MAY 9 1997

Federal Communications Commission  
Office of Secretary

May 9, 1997

**BY HAND DELIVERY**

Mr. William F. Caton  
Federal Communications Commission  
Room 222  
1919 M Street, NW  
Washington, DC 20554

DOCKET FILE COPY ORIGINAL

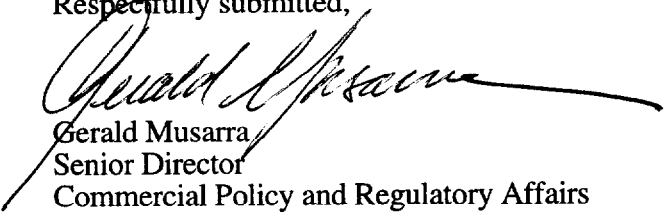
**RE: IB Docket No. 95-183**

Dear Mr. Caton:

On May 5, 1997, Lockheed Martin Corporation ("Lockheed Martin") filed initial comments in IB Docket No. 97-95, which proposes allocations of spectrum for satellite and terrestrial services in the bands 36-51.4 GHz. See Notice of Proposed Rulemaking, FCC 97-85 (released March 24, 1997). Because that proceeding addresses in a broader context the same frequency bands covered by the above-referenced docket, Lockheed Martin respectfully requests that the attached copy of its comments in IB Docket No. 97-95 be included in the record of this proceeding. Copies of these comments are being served simultaneously on those parties that have previously commented in IB Docket No. 95-183. See Attached Service List.

Should there be any questions relating to this matter, please contact the undersigned.

Respectfully submitted,

  
Gerald Musarra  
Senior Director  
Commercial Policy and Regulatory Affairs  
Space and Strategic Missiles Sector

No. of Copies rec'd  
List ABOVE

0 + 1

## **SERVICE LIST**

Michael K. Owens  
Ameritech  
1401 H Street, NW, Suite 1020  
Washington, DC 20005

Robert J. Keller  
Robert J. Keller, P.C.  
4200 Wisconsin Avenue, NW  
Suite 106-233  
Washington, DC 20016-2143

Carl W. Northrop  
Paul Hastings Janofsky & Walker, L.L.P.  
1299 Pennsylvania Avenue, NW, 10th Floor  
Washington, DC 20004-2400

David C. Jatlow  
Young & Jatlow  
2300 N Street, NW, Suite 600  
Washington, DC 20037

Michael F. Finn  
Willkie Farr & Gallagher  
1155 - 21st Street, NW, Suite 600  
Washington, DC 20036-3384

Thomas A. Hart, Jr.  
Ginsburg Feldman & Bress, Chartered  
1250 Connecticut Avenue, NW  
Washington, DC 20036-2603

Walter H. Sonnenfeldt  
Walter Sonnenfeldt and Associates  
4904 Ertter Drive  
Rockville, MD 20852

Kurt A. Wimmer  
Covington & Burling  
1201 Pennsylvania Avenue, NW  
PO Box 7566  
Washington, DC 20044-7566

Louis Gurman  
Gurman Blask & Freedman, Chartered  
1400 - 16th Street, NW, Suite 500  
Washington, DC 20036

Regina Harrison  
Pacific Telesis Group - Washington  
1275 Pennsylvania Avenue, NW, Suite 400  
Washington, DC 20004-2496

Coleen Helmreich, M.E.  
U.S. West, Inc.  
1020 - 19th Street, NW, Suite 700  
Washington, DC 20036

Albert Shuldiner  
Vinson & Elkins  
1455 Pennsylvania Avenue, NW  
Washington, DC 20004-1008

Leonard R. Raish  
Fletcher Heald & Hildreth, P.L.C.  
1300 North 17th Street, 11th Floor  
Rosslyn, VA 22209

Mark J. Golden  
Personal Communications Industry Association  
500 Montgomery Street, Suite 700  
Alexandria, VA 22314-1561

Richard J. Metzger  
Association for Local Telecommunications Services  
1200 - 19th Street, NW, Suite 560  
Washington, DC 20036

Lynn R. Charytan  
Wilmer, Cutler & Pickering  
2445 M Street, NW  
Washington, DC 20037-1420

Philip L. Verveer  
Willkie Farr & Gallagher  
1155 - 21st Street, NW, Suite 600  
Washington, DC 20036-3384

Pantelis Michalopoulos  
Steptoe & Johnson, L.L.P.  
1330 Connecticut Avenue, NW  
Washington, DC 20036-1795

Thomas J. Dougherty, Jr.  
Gardner Carton & Douglas  
1301 K Street, NW, East Tower  
Suite 900  
Washington, DC 20005-3317

O. James Klein  
Klein & Maines, P.L.L.C.  
1201 South Alma School, Suite 7550  
Mesa, AZ 85210

Theodore W. Pierson, Jr.  
Pierson & Burnett, L.L.P.  
1667 K Street, NW, Suite 801  
Washington, DC 20006

James J. Freeman  
Reed Smith Shaw & McClay  
1301 K Street, NW, East Tower  
Suite 1100  
Washington, DC 20005-3317

Donald J. Evans  
Evans & Sill, P.C.  
1627 Eye Street, NW, Suite 810  
Washington, DC 20006

Ronald D. Maines  
Klein & Maines, P.L.L.C.  
2300 M Street, NW, Suite 900  
Washington, DC 20037

George Y. Wheeler  
Koteen & Naftalin, L.L.P.  
1150 Connecticut Avenue, NW  
Washington, DC 20036

Daniel S. Goldberg  
Goldberg, Godles, Wiener & Wright  
1229 - 19th Street, NW  
Washington, DC 20036

Betsy S. Granger  
Pacific Bell Mobile Services  
4420 Rosewood Drive  
Building 2, 4th Floor  
Pleasanton, CA 94588

R. Michael Senkowski  
Wiley Rein & Fielding  
1776 K Street, NW  
Washington, DC 20006

Chris Blane  
METREX  
5 Concourse Parkway, Suite 3100  
Atlanta, GA 30328

Carol Bjelland  
GTE Service Corp.  
1850 M. Dytry, zn.E.  
Suite 1200  
Washington, DC 20036

Joe Edge  
General Communication Inc.  
901 - 15th Street, NW, Suite 900  
Washington, DC 20006

Karl Brothers  
PO Box 58040  
Fairbanks, AK 99711

L.R. Daniels  
President and CEO  
4420 Rosewood Drive  
Building 2, 4th Floor  
Pleasanton, CA 94588

Paul J. Sinderbrand  
Wilkinson, Barker, Knauer  
1735 New York Avenue, NW, Suite 600  
Washington, DC 20006

Calcell, Inc.  
1605 Lassin Way, Suite 100  
Burlingame, CA 94010

David L. Nace  
Lukas, McGowan, Nace & Gutierrez  
1111 Nineteenth Street, NW  
Washington, DC 20036

Haley, Bader & Potts  
4350 North Fairfax Drive, Suite 900  
Arlington, VA 22203

John A. Prendergast  
2120 L Street, NW, #300  
Washington, DC 20037

Karten Amlie  
Leibowitz & Association  
One SE Third Avenue  
Miami, FL 33131-1715

McCaw Cellular Comm. Inc.  
1150 Connecticut Avenue, NW, 4th Floor  
Washington, DC 20036

Peter Tannenwald  
Irwin, Campbell & Tannenwald, P.C.  
1730 Rhode Island Avenue, NW, Suite 200  
Washington, DC 20554

Cellular Telcom Industry Association  
1250 Connecticut Avenue, NW, Suite 200  
Washington, DC 20036

Ellen S. Deutsch  
Citizens Utility  
PO Box 340  
Elk Grove, CA 95759

James U. Troup  
Laura Montgomery  
Arter & Hadden  
1801 K Street, NW, Suite 1200  
Washington, DC 20006

John Winston  
Rubin, Winston, Diercks, Harris & Cooke  
1333 New Hampshire Avenue, NW, 10th Floor  
Washington, DC 20036

Kenneth R. Cole  
Century Telephone Ent.  
100 Century Park Drive  
Monroe, LA 71203

Michael F. Morrone  
Keller & Heckman  
1001 G Street, NW, Suite 500  
Washington, DC 20001

Christopher R. Hardy  
Comsearch  
2002 Edmund Halley Drive  
Reston, VA 22091

William M. Custer  
Cambridge Partners, Inc.  
14 South High Street  
New Albany, OH 43054

James S. Eaton  
Microwave Partners  
4215 - 50th Street, NW  
Washington, DC 20016

Robert J. Miller  
Gardere & Wynne  
1601 Elm Street, Suite 3000  
Dallas, TX 75201

Steven P. Seiter  
GHz Equipment Co.  
1834 East Baseline Road, Suite 202  
Tempe, AZ 85283

Bruce R. Francis  
Spectrum Communications  
7521 East Edgemont  
Scottsdale, AZ 85257

William R. Lye  
RR 7, Box 87  
Fulton, NY 13069

Lockheed Martin Corporation  
Space and Strategic Missiles Sector Washington Operations  
Crystal Square 2 - Suite 300 1725 Jefferson Davis Highway Arlington, VA 22202  
Telephone 703-413-5800 Facsimile 703-413-5819

**FILE COPY**  
**LOCKHEED MARTIN** 

**RECEIVED**  
**MAY - 6 1997**

*Federal Communications Commission  
Office of Secretary*

May 6, 1997

**BY HAND DELIVERY**

Mr. William F. Caton  
Federal Communications Commission  
Room 222  
1919 M Street, NW  
Washington, DC 20554

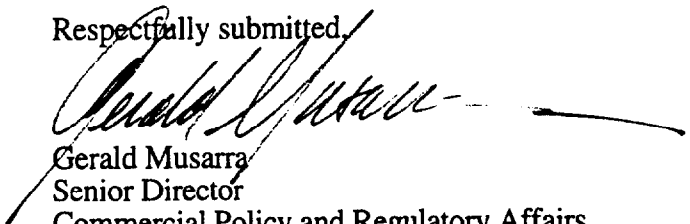
**RE: IB Docket No. 97-95 (RM-8811)**

Dear Mr. Caton:

Lockheed Martin Corporation transmits herewith an original and four copies of a corrected version of its comments in the above-referenced proceeding. See Notice of Proposed Rulemaking, IB Docket No. 97-95, RM-8811 (released March 24, 1997). This version corrects minor typographical and formatting errors in the comments filed yesterday, and also adds footnote 22, which was omitted from that filing. There are no substantive changes in the text of the document.

Please substitute this corrected version for all copies of Lockheed Martin's comments filed on May 5, 1997. Should there be any questions concerning this matter, please contact the undersigned.

Respectfully submitted,

  
Gerald Musarra  
Senior Director  
Commercial Policy and Regulatory Affairs  
Space and Strategic Missiles Sector

**WASHINGTON, D.C. 20554**

RM-8811

## **COMMENTS OF LOCKHEED MARTIN CORPORATION**

**May 5, 1997**

## **TABLE OF CONTENTS**

	<b><u>PAGE</u></b>
SUMMARY .....	ii
I. INTRODUCTION .....	2
II. THE COMMISSION'S PROPOSAL .....	6
III. DISCUSSION .....	8
A. Guiding Principles for Effective Spectrum Planning .....	8
1. The Commission Must Ensure Global Allocations for Satellite Services, and Provide Opportunities to Implement All Types of Satellite Applications, Fixed, Mobile, and Broadcast .....	8
2. The Commission Must Consider The Historical Development of Satellite Frequencies and Rationally Accommodate Long-Term Needs for Satellite Spectrum .....	10
3. The Commission Must Encourage Realistic Spectrum Sharing Wherever Feasible .....	13
4. The Commission Must Defer Finalizing Any Domestic Allocations Until The Full International Picture Is Known .....	13
B. The Commission's Proposed Band Plan Has A Number Of Substantial Defects .....	15
1. Proposed FSS Downlink Bands .....	15
2. Proposed FSS Uplink Bands .....	17
3. Proposed "Underlay" Wireless Services .....	18
IV. CONCLUSION .....	18

## SUMMARY

Lockheed Martin congratulates the Commission on its timely efforts to accommodate current and anticipated future spectrum requirements in the 36-51.4 GHz bands, and to expedite the process of planning to meet these needs. Nonetheless, while Lockheed Martin supports the Commission's approach of addressing the spectrum as a whole, in the end Lockheed Martin does not believe that the plan described in the NPRM strikes the appropriate balance necessary to effect a rationally-based, globally-minded spectrum plan, and to promote the important goals that the Commission identifies.

In particular, the NPRM does not include satellite allocations of sufficient bandwidth to ensure the development of the multiple types of satellite systems that may be planning to utilize the frequencies above 36 GHz. The NPRM also neither addresses nor satisfies the requirement of preserving global satellite spectrum allocations, and the Commission has not reconciled its domestic proposals with known deployments of terrestrial services in other regions of the world. It is critically important that the Commission develop balanced international proposals for the 1997 World Radiocommunication Conference ("WRC-97") to ensure that viable spectrum is available for both space-based and terrestrial applications, and that harmonized global allocations are made, where possible.

In reassessing the underpinnings of the band plan that was put forth in the NPRM, and making the revisions that will be the direct product thereof, the Commission should be guided by several basic principles necessary to reasoned and efficient frequency planning:

First, the Commission, while acting domestically, must nevertheless continue to think globally. Global allocations are critical for most satellite applications — from both technical and economic points of view. (While global spectrum allocations may also be desirable for terrestrial users, they are not essential; with terrestrial systems, it is more of a question of

economies of scale than it is of economic and technological viability.) In general, it is far easier to maintain internationally an existing global allocation of spectrum than it is to secure a new global allocation. The reality is that any domestic action that removes extant global satellite spectrum from the allocation pool will make the United States' prospects of attaining additional global allocations of satellite spectrum through the WRC process exponentially more difficult.

Second, recognizing the inherent developmental differences between terrestrial and satellite services — differences that manifest themselves both in terms of the timetable for commercial roll out and in the magnitude of the investment of resources that is required — the Commission cannot expect to engage in rational decision making when it proposes to allocate spectrum based only on the requirements identified in a single pending satellite application. Satellite operators will rarely, if ever, be the initial commercial proponents of systems in new frequency bands allocated on a co-primary basis to both satellite and terrestrial users. Indeed, many of the difficulties in the just concluded 28 GHz proceeding stemmed from the Commission's licensing of a single terrestrial system that subsequently fought to be protected in the ensuing omnibus allocation proceeding. One of the most important lessons of that proceeding was that the Commission must employ an appropriate process to evaluate the needs of satellite-based communications systems in particular spectrum bands. The Commission should use the current proceeding to ensure that sufficient spectrum resources are available in bands allocated to both terrestrial and satellite systems to promote future growth of advanced U.S. space-based telecommunications.

Third, the Commission should endeavor, wherever possible, to optimize spectrum efficiency by exploring all realistic sharing scenarios between satellite and terrestrial services in order to maximize the ability to license providers in each service. At the very least, the

Commission should not foreclose the opportunity that sharing scenarios will emerge, and it must not abandon its responsibility to adopt the technical requirements necessary to facilitate such sharing.

Fourth, the Commission should defer finalizing a band plan domestically for the spectrum between 36 and 51.4 GHz until it, in conjunction with the satellite and terrestrial service communities, has developed, proposed and achieved appropriate global allocations at WRC-97. This means as well that the Commission must refrain in the interim from taking any action on the 36 - 51.4 GHz band, whether in the context of this proceeding or the related Millimeter Wave or 39 GHz proceedings, as they directly impact satellite interests and/or spectrum now allocated for satellite use at issue in this proceeding. The interrelationship of the domestic and international events could mean that the results of WRC-97 would require the revisiting or adjustment of any earlier Commission action. Accordingly, the Commission should defer action in the Millimeter Wave and 39 GHz proceedings and, instead, designate spectrum across the entire band in the instant proceeding.

With these principles in mind, the Commission can proceed to give the competing interests the attention and consideration they require. Lockheed Martin stands prepared to assist the Commission in developing a band plan for WRC-97 that strikes the appropriate balance between the interests of the early terrestrial entrants into the bands above 36 GHz and the satellite community's collective interest in advancing its historic leadership in the global marketplace into the bands they have been working toward commercializing for some time.

BEFORE THE

**Federal Communications Commission**

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Allocation and Designation of Spectrum for	)	IB Docket No. 97-95
Fixed-Satellite Services in the 37.5-38.5 GHz,	)	
40.5-41.5 GHz, and 48.2-50.2 GHz Frequency	)	RM-8811
Bands; Allocation of Spectrum to Upgrade	)	
Fixed and Mobile Allocations in the	)	
40.5-42.5 GHz Frequency Band; Allocation of	)	
Spectrum in the 46.9-47.0 GHz Frequency	)	
Band for Wireless Services; and Allocation of	)	
Spectrum in the 37.0-38.0 GHz and	)	
40.0-40.5 GHz for Government Operations	)	

To The Commission:

**COMMENTS OF LOCKHEED MARTIN CORPORATION**

Lockheed Martin Corporation ("Lockheed Martin"), pursuant to Sections 1.415 and 1.419 of the Commission's Rules (47 C.F.R. §§ 1.415 & 1.419 (1996)), hereby comments on the Commission proposals contained in the above captioned Notice of Proposed Rulemaking, ("NPRM").<sup>1</sup> In the NPRM, the Commission proposes to make domestic allocations and designations of certain frequency bands to the fixed-satellite services ("FSS"), and generally sets forth a spectrum plan for the millimeter wave bands between 36 and 51.4 GHz — earmarking certain portions of these bands for FSS and for High Density Fixed Services ("HDFS") and other terrestrial wireless services.

---

<sup>1</sup> See *Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz, and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band, Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations*, Notice of Proposed Rulemaking, IB Docket No. 97-95, RM-8811 (rel. Mar. 24, 1997).

## I. INTRODUCTION

Lockheed Martin commends the Commission's timely efforts to develop a comprehensive plan for accommodating current and anticipated future spectrum requirements in the 36-51.4 GHz bands. As the Commission states in the NPRM, an omnibus approach to frequency allocation in these bands should "assist in planning for WRC-97, and ensure that all proposed uses are given due consideration." NPRM, FCC 97-85, slip op. at 5 (¶ 9). In that regard, Lockheed Martin believes that it is critically important for the Commission to devise international proposals for WRC-97 that are intended to secure availability of viable spectrum for both space-based and terrestrial applications, and to facilitate harmonized global allocations wherever possible. Consistent with these objectives, the Commission's disposition of this domestic proceeding should be informed by the outcome of the WRC-97 with respect to the 36-51.4 bands. Moreover, as the Commission has invited comment on the entire 36-51.4 GHz band in this omnibus proceeding, it should defer action in the Millimeter Wave and 39 GHz proceedings and, instead, designate spectrum across the entire band in the instant proceeding.<sup>2</sup> Piecemeal action on the various sub-bands under consideration or premature action based on the mere possibility of new allocations at WRC-97 will limit the Commission's flexibility and diminish the likelihood that this proceeding will result in fair and adequate provisions for meeting the needs of all likely uses of the 36-51.4 GHz bands.

While Lockheed Martin supports the Commission's approach of addressing the spectrum as a whole, and has carefully considered the many facets of the

---

<sup>2</sup> See Amendment of Parts 2 and 15 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications, Notice of Proposed Rulemaking, 9 FCC Red 7078 (1994) ("Millimeter Wave Proceeding"). The Commission deferred issues relating to such licensed services to future proceedings. See Millimeter Wave Proceeding, First Report and Order and Second Notice of Proposed Rulemaking, 11 FCC Red 4481 (1995). See Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands C Implementations of Section 309(j) of the Communications Act, Notice of Proposed Rulemaking and Order, 11 FCC Red 5930 (1995) ("39 GHz Notice").

proposal set forth in the NPRM, Lockheed Martin does not believe that the plan described in the NPRM strikes the appropriate balance necessary to effect a rationally-based, globally-minded spectrum plan, and to promote the important goals that the Commission identifies. In particular, the NPRM does not include satellite allocations of sufficient bandwidth to enable the implementation of the multiple types of satellite services that are capable of utilizing the frequencies above 36 GHz, thus effectively denying consumers worldwide the competitive benefits of continued development of digital space-based communications services. The NPRM also neither addresses nor satisfies the requirement for global satellite spectrum allocations, and the Commission has not reconciled the domestic proposals with known deployments of terrestrial services in other regions of the world.

In reassessing the underpinnings of the band plan that was put forth in the NPRM, and making the revisions that will be the direct product thereof, the Commission should be guided by several basic principles necessary to reasoned and efficient frequency planning:

First, the Commission, while acting domestically, must nevertheless think globally. The International Table of Frequency Allocations currently provides 3 GHz of global FSS spectrum in each direction (47.2-50.2 GHz for Earth-to-space use, and 37.5-40.5 GHz for space-to-Earth use).<sup>3</sup> Global allocations are critical for most satellite applications — from both technical and economic points of view. In general, it is far easier to maintain internationally an existing global allocation of spectrum than it is to secure a new global allocation. While global allocations of spectrum may also be desirable for terrestrial systems, they are not essential; with terrestrial systems, it is more of a question of economies of scale than it is of economic and technological viability. By contrast, global and regional satellite systems are inherently dependent upon harmonized allocations to achieve global/regional coverage; moreover, the same economies of scale that

---

<sup>3</sup> See 47 C.F.R. § 2.106 (1996).

are desirable for terrestrial systems are no less desirable for the satellite systems' ground and satellite equipment.

The reality is that any domestic action that removes extant global satellite spectrum from the allocation pool will make the United States' prospects of attaining additional global allocations of satellite spectrum at an International Telecommunication Union ("ITU") World Radiocommunication Conference ("WRC") exponentially more difficult.<sup>4</sup>

Second, the Commission's decision-making with respect to spectrum planning must take into account the inherent developmental differences between terrestrial and satellite services — differences that manifest themselves both in terms of the timetable for commercial roll out and in the magnitude of the investment of resources that is required. The Commission's decision-making clearly does not proceed from an understanding of these fundamental and important differences when it proposes to allocate spectrum based only on the requirements identified in a single pending satellite application.<sup>5</sup> It is often the case that satellite operators are not the initial commercial proponents of systems in new frequency bands allocated on a co-primary basis to both satellite and terrestrial users. Indeed, many of the difficulties in the just concluded 28 GHz proceeding<sup>6</sup> stemmed from the Commission's decision to license a single terrestrial system that subsequently fought to be protected in the ensuing omnibus allocation

---

<sup>4</sup> What happened to the U.S. at WRC-95 in connection with the 2 GHz MSS bands is an example of the type of difficulties that can arise. At WARC-92, the U.S. successfully proposed the international allocation of spectrum at 2 GHz for MSS services. By 1995, the U.S. had concluded a domestic allocation proceeding over the objection of many in the satellite industry that resulted in a portion of the WARC-92 MSS allocation being reallocated for Personal Communications Services (PCS), an incompatible terrestrial use. The U.S. proposal to WRC-95 for yet another international MSS spectrum allocation to replace the spectrum won at WARC-92 and then, in the interim, reallocated domestically in the U.S. to an incompatible service met with strong resistance. The matter was not finally resolved at that conference, and remains a US agenda item for WRC-97.

<sup>5</sup> *Application of Motorola Satellite Systems, Inc. to Construct, Launch, and Operate the M-Star System*, File No. 157-SAT-P/LA-96(72) (Sept. 4, 1996).

<sup>6</sup> Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, 3 CR 857 (1996).

proceeding. This recent and difficult experience should serve to underscore the appropriate approach for evaluating the needs of satellite-based communications systems in particular spectrum bands, given the differential lead times for satellite and terrestrial services. The Commission should use this proceeding to alter its prior approach to identifying spectrum needs and service development opportunities; the Commission needs to ensure that sufficient useable spectrum is available in bands allocated to both terrestrial and satellite systems to enable the continued future growth of advanced U.S. space-based telecommunications.

Third, the Commission should endeavor, wherever possible, to optimize spectrum efficiency by exploring all realistic sharing scenarios between satellite and terrestrial services in order to maximize the ability to license providers in each service. At the very least, the Commission should not foreclose the opportunity that sharing scenarios will emerge, and it must not shrink from its responsibility to do so, whether through specific technical requirements or other means. Moreover, as a general matter, radiocommunications services suffer greater atmospheric and rain attenuation problems as frequency increases. Such problems are much more severe for satellite networks than for terrestrial systems as a result of differences in communication path lengths and design constraints on link power margins aboard spacecraft. Thus, the Commission has significantly more flexibility in designating terrestrial bands throughout the entire 36-51.4 GHz range than it has for satellite bands. In light of these technical considerations, Lockheed Martin believes generally that spectrum for satellite services should be designated at the lowest possible frequencies in the 36.0-51.4 GHz band.

Fourth, the Commission should defer finalizing a band plan domestically for the spectrum between 36 and 51.4 GHz until it, in conjunction with the satellite and terrestrial communities, has developed, proposed and achieved global allocations at WRC-97. This means as well that the Commission must refrain in the interim from taking any action on the 36-51.4 GHz bands, whether in the context of this proceeding or the related Millimeter Wave and 39 GHz proceedings, as they directly impact satellite interests

and/or spectrum now allocated to satellite use at issue in this proceeding. Clearly, the interrelationship of the domestic and international events could mean that the results of WRC-97 would require the revisiting or adjustment of any earlier Commission action. With these principles in mind, the Commission can proceed to give the competing interests the attention and consideration they require. Lockheed Martin stands prepared to assist the Commission in developing a band plan for WRC-97 that strikes the appropriate balance between the interests of the early terrestrial entrants into the bands above 36 GHz and the satellite community's collective interest in advancing its historic leadership in the global marketplace into the bands they have been working toward commercializing for some time.

In this regard, Lockheed Martin has been an active participant in several post-NPRM meetings between loose coalitions of satellite and terrestrial interests aimed at arriving at an agreeable modification to the Commission's band plan. Lockheed Martin is also continuing to explore, on its own, potential compromise solutions, and will pursue additional initiatives to this end in the very near future.

## **II. THE COMMISSION'S PROPOSAL**

Examination of the proposed band plan contained in the NPRM and the U.S. Table of allocations reveals drastic modifications of existing U.S. allocations. The Commission's overall concept for the 36-51.4 GHz band, which includes proposals under consideration in the Millimeter Wave and 39 GHz proceedings, is depicted below:

<b>Frequencies</b>	<b>Proposed Commercial Designations<sup>7</sup></b>
36.0-37.0 GHz	No Change (includes Fixed/Mobile)
37.0-37.5 GHz	CWS
37.5-38.5 GHz	FSS (NGSO) and CWS Underlay
38.5-38.6 GHz	CWS
38.6-40.0 GHz	CWS
40.0-40.5 GHz	CWS
40.5-41.5 GHz	FSS (GSO) and CWS Underlay
41.5-42.5 GHz	CWS
42.5-43.5 GHz	No Change (includes Fixed/Mobile and FSS uplink)
43.5-45.5 GHz	No Non-Government Allocation
45.5-46.7 GHz	No Change
46.7-46.9 GHz	No Change
46.9-47.0 GHz	CWS
47.0-47.2 GHz	No Change
47.2-48.2 GHz	CWS
48.2-49.2 GHz	FSS (NGSO) and CWS Underlay
49.2-50.2 GHz	FSS (GSO) and CWS Underlay
50.2-50.4 GHz	No Change (includes Fixed/Mobile)
50.4-51.4 GHz	CWS

<sup>7</sup> See NPRM, FCC 97-85, Slip op. at ¶14. We have included allocations contained in the U.S. Table of Allocations to accurately depict all spectrum potentially available for terrestrial and satellite services

Comparing the amounts of spectrum designated or retained for the various communications services with existing U.S. allocations reveals the severity of the changes under consideration by the Commission. Although the Commission suggests that its proposal balances the interests of the satellite and terrestrial communities, the band plan is, from a purely quantitative standpoint, weighed heavily in favor of terrestrial interests at the expense of the U.S. satellite industry. Under the proposal, spectrum allocated to satellite services would retain only 38.5 percent of the spectrum originally allocated to satellite services generally, while particular services, such as MSS and BSS, would have no designation. Lockheed Martin believes that the Commission can, and should, strike a more appropriate balance among satellite and terrestrial services in the 36-51.4 GHz band.

### **III. DISCUSSION**

#### **A. Guiding Principles for Effective Spectrum Planning**

- 1. The Commission Must Ensure Global Allocations for Satellite Services, and Provide Opportunities to Implement All Types of Satellite Applications, Fixed Mobile, and Broadcast.**

As indicated above, it is of critical importance to the proper development of new services in the bands above 36 GHz that the Commission allocate sufficient spectrum, preferably in contiguous blocks, for satellite services in bands that can actually be used to implement global systems.<sup>8</sup> While the current FSS allocations in the bands 37.5 - 40.5 GHz and 47.2 - 50.2 GHz cover all three ITU regions, in most instances the satellite services are co-primary with other services, which in some cases are already using portions of the spectrum. Because the ability of global satellite systems to use portions

---

<sup>8</sup> The greater the amount of spectrum that the Commission allocates on a contiguous basis for satellite use, the more competitive digital satellite-based communications will be to the existing terrestrial service providers due to the inherent efficiencies gained from contiguous bandwidth there is no indication how, or even whether, the Commission would accommodate these services in the future. For example, the Commission's proposed designation of terrestrial fixed and mobile, both as primary and underlay services, in the 40.5-42.5 GHz band raises serious questions as to future availability of this spectrum for BSS.

of the existing spectrum is already limited in some regions by the early entry of terrestrial systems, the Commission must act swiftly and aggressively to close the breach, and preserve what it can of the current global allocations and the ability to implement all three types of satellite services — fixed (FSS), mobile (MSS) and broadcast (BSS) — that exist in the bands that are the subject of the instant NPRM.

While the Commission recognizes at several points in the NPRM the need to ensure that there are consistent worldwide allocations in these bands,<sup>9</sup> its proposed band plan, if adopted, would actually undermine this goal with respect to satellite services by permanently foreclosing significant portions of the current global FSS and MSS allocations to satellite use. Although harmonized international allocations are desirable for almost any satellite service, they are critical for particular types of satellite systems, such as nongeostationary orbit systems. In the case of geostationary systems, there is an increasing need for harmonized allocations because of the trend toward building and deploying identical satellites with the capability of reconfiguring the service area in orbit, as required. It is self-evident that systems that seek to provide global coverage using a single set of space-based facilities that cross international boundaries must have the ability to operate throughout the areas that they cover. Thus, while common global allocations to wireless services are undeniably desirable, because they allow equipment manufacturers to achieve economies of scale, some satellite system proposals would be thwarted entirely if the same frequencies are not available on a worldwide basis.<sup>10</sup>

---

<sup>9</sup> Contiguous spectrum for satellite services is important because it provides greater flexibility for satellite services to operate with multiple adjacent wide bandwidth channels, while minimizing the overall required operating bandwidth of the on-board communications equipment.

<sup>10</sup> Even if consistent global allocations were not absolutely required for a particular satellite service, they would be desirable for all of the same reasons — economies of scale, portability of ground equipment, common satellite sparing, etc. — that apply in the case of terrestrial applications.

**2. The Commission Must Consider The Historical Development of Satellite Frequencies and Rationally Accommodate Long-Term Needs for Satellite Spectrum.**

---

In order to make a rational allocation decision in a frequency band that is allocated internationally for satellite and terrestrial use, the Commission must not lose sight of the fact that it is inherent in the nature of satellite and terrestrial services that they develop according to different timetables. In the race to implement systems in bands shared on a co-primary basis by the fixed service and the FSS, the fixed service will win every time. It happened at C-band, Ku-band, 30/20 GHz, and is now happening too at 36/51 GHz.

The reasons are obvious: the lead time for fixed services, whether point-to-point or point-to-multipoint, is shorter than the time needed for the satellite industry. Quite simply, the technology required to deploy satellite systems is more complex and requires more development time to ascertain what is technically feasible and, ultimately, commercially viable. In the case of the 30/20 GHz bands, it took a NASA-sponsored, decade-long initiative (ACTS) to prove the viability of these bands for commercialization. In the interim, terrestrial users deployed a limited number of systems, effectively gaining "first come-first served" rights that contributed significantly to the Commission's difficulties in the 28 GHz decision-making process.

The resource investments seemingly valued by the Commission in rendering allocation decisions differ exponentially as well. A satellite system with space-qualified hardware that has to be specially developed for the particular characteristics of the frequency bands involved, requires a much greater long-term upfront expenditure than a terrestrial system. Yet, it does not take national roll-out of service by a terrestrial system — which admittedly can cost hundreds of millions of dollars — to gain the type of "rights" to a band that the Commission will seek to accommodate; in the 28 GHz proceeding, the licensing of a single-cell analog demonstration system in the point-to-multipoint fixed service formed the basis for the domestic allocation to fixed services of

1000 MHz in the 28 GHz band. By contrast, satellite networks comprised of specially-designed space and earth stations are required to be deployed before exploitation of a new FSS band can occur. Because of the inherent differences in development and lead time between the satellite and terrestrial communities, the burden of this approach falls disproportionately on the satellite community.

If an FSS allocation that has not yet been used can be eviscerated by the inevitably-earlier arrival of terrestrial interests and employment by the Commission of a first-come, first-served allocation policy — as the Commission proposes in the NPRM — the upshot will be the thwarting of commercial research and development by U.S. satellite companies (thereby, reversing the current trends away from relying on government-led advanced technology developments); the costly sacrificing of the commercial dividends of the government-proven and -deployed advanced satellite technology; the consequential stifling of innovation and advancement; and ultimately, the end of the leadership role the U.S. has occupied in the field of satellite communications for almost the last half-century. Put simply, the fact that a band allocated to the FSS appears “vacant” does not mean that it is not at that same time being aggressively researched and developed for use by satellite interests.

Under these circumstances, the Commission cannot base the satellite industry’s future in the 36-51.4 GHz bands on the single pending application.<sup>11</sup> At the very least, it was and is incumbent upon the Commission to invite satellite applications (pursuant to a filing window) for the entire 36-51.4 GHz band, and base its balancing of requirements on the applications it receives.<sup>12</sup> Because the FCC has not yet opened a filing window for other satellite applications, it is lacking critical information concerning

---

<sup>11</sup> See NPRM, FCC 97-85, slip op. at 4 (¶ 10). While the Commission notes that it took into account “other expressions of interest in providing services in these bands,” *id.*, it does not specify whether those expressions were from satellite interests.

<sup>12</sup> Given the fact that satellite manufacturers — a highly competitive industry — derive different technical approaches to a frequency band, it would be unrealistic for the Commission to expect applications to be filed until late in a filing window, in order that the technical approaches and design features can be withheld from potential competitors for as long as possible. This same competitiveness makes it unreasonable for the Commission to rely on the lone M-Star filing as representative of the industry’s requirements.

the range of system proposals that these bands can support. This information is crucial to the development of a comprehensive and rational international allocation proposal for WRC-97. Therefore, Lockheed Martin believes the Commission should move forward in this proceeding by soliciting additional applications for the 36-51.4 GHz band to be considered concurrently with Motorola's M-Star proposal, while simultaneously learning of the full range of contemplated satellite uses of this spectrum.<sup>13</sup>

Ironically, the Commission's eschewing of satellite interests comes just at the time when commercial exploitation of the subject bands is becoming viable. As the Commission notes in the NPRM, "most millimeter wave technology [prior to 1994] had been funded by the Government for military and scientific applications." NPRM, FCC 97-85 slip op. at 3 (¶ 3). Lockheed Martin has been directly involved in the development of hardware for use in the 43.5-45.5 GHz band in connection with the Defense Department's Milstar satellite program. For many companies, such U.S. government projects serve as a "proof of concept" for development of future commercial space applications in nearby bands.<sup>14</sup> In these bands, as in other frequency bands, private satellite ventures based on the technology devised to meet the needs of the military or other government agencies will arise, creating in their wake thousands of new jobs in the private sector.

The Commission must not pursue the course it proposes in the NPRM. Instead, it must step back, consider the impact of its proposal on the satellite industry,

---

<sup>13</sup> In the NPRM, the Commission states its intention to place the Motorola application on public notice in the near future, but suggests that it might limit applicants to applying for the band segments identified in its proposal for FSS use. See NPRM, 97-85, slip op. at 12 (¶ 22). This is counterproductive to the goal to preserve the ability for a variety of services to be implemented in the band. Such an approach would be a mistake, as it could arbitrarily limit the new technical approaches to frequencies that the Commission has identified for satellite use based on minimal information. The Commission's approach appears backward; the Commission should first learn (by opening a filing window) where the satellite industry needs spectrum to implement new advanced communications systems and then determine how those needs can be accommodated.

<sup>14</sup> In fact, additional benefits may be had by the Commission allocating spectrum in bands as close as technically feasible to the Milstar bands. For example, equipment may be mass-produced that can tune over 1-2 GHz enabling multiple types of users (government and private) to benefit from the economies of scale offered to the ground terminal community.